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THE SUITABILITY OF KENNEBEC AND SEBAGO POTATO VARIETIES FOR SHIPPING AND CHIP-MAKING WHEN GROWN NEAR CHARLESTON, S. C.

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The Suitability of Kennebec and Sebago Potato Varieties for Shipping and Chip-making When Grown Near Charleston, S. C. 1/

INTRODUCTION

Within the past two or three years, potato growers in the Charleston, South Carolina area have shifted almost completely to the Sebago variety. The primary reason for this shift is the ability of this variety to withstand more exposure and handling at harvest than other varieties formerly grown in this area. Because of this ability to withstand considerable rough treatment, it makes a clean presentable pack after it is washed, dried, graded, and shipped. Sebago has some resistance to late blight and common scab, but produces a relatively lower yield than the varieties formerly grown in the area. With the introduction of Kennebec, interest immediately developed in this new variety because of its ability to produce high yields of smooth white potatoes and its near immunity to late blight in tests conducted by the State Experiment Station at Charleston. Before recommending Kennebec to the growers in the Charleston area it was thought desirable to determine whether it would be as resistant to exposure, handling, and shipping injuries as the Sebago variety. Since Sebago is considered well adapted for the manufacture of chips and since over half of the annual crop from the Charleston area is used for this purpose, Sebago and Kennebec were also compared in this respect.

METHODS

SHIPPING TESTS

Within recent years most of the potatoes produced in the Charleston area have been packed in 100 pound burlap bags and shipped to market in trucks, usually vans. Most of these potatoes have been washed and dried before bagging.

On June 6, 1950 potatoes of both varieties were dug on the State Experiment Station farm. The potatoes were picked up quickly after digging and removed from the field without much delay in order to avoid undue exposure in the field. They were taken to a nearby shed at Stono, S. C., where they were washed, dried, graded and packed for shipment. Three bags of each variety were loaded onto two different vans, one going to New York City and the other to Chicago, Ill. One bag of each variety was placed in the top layer behind the front vents (top layer, stack 1); the other two were placed in the top and middle layers about half way back in the truck (stack 10). The type of load used was a 6-3-3-1 stack with the bottom 6 bags upright and slightly separated to provide air channels between them. A Ryan recording thermometer was placed in the center of each load to provide a record of temperatures in transit. All vents of the trucks were kept open en route to their respective destinations.

The truck to New York City required about 2 days to reach its destination and unload while the truck to Chicago took about 3 days. After arrival in the terminal market and again after 4 days at New York and 7 days at Chicago the test bags were examined for defects.

1/ This study was carried out as part of the Southern Regional Project on "Spoilage in Marketing Early Irish Potatoes."

SKINNING AND EXPOSURE TESTS

Some unwashed potatoes of each variety were held under the protection of a canvas on an open shed overnight and then exposed to the weather after being rolled around in burlap bags to insure the removal of considerable skin. It was estimated that an average of 60% of the skin was removed from the potatoes, part of which had been removed the day of digging. Thermo-couples were inserted just under the surface of skinned and non-skinned potatoes of each variety to record temperatures near the surface of the most exposed part of the potatoes. When the potatoes were exposed, the sky was quite cloudy and somewhat hazy. The air temperature did not go over 85°F. but a brisk wind blew during the time of exposure. Evaporation was recorded with a Livingston white porous porcelain atometer bulb that had a coefficient of 0.77.

CHIPPING TESTS

Some potatoes of each variety were shipped the day of digging by railway express to Beltsville, Md., arriving June 9, where they were tested for suitability for chip making. 1/

RESULTS

SHIPPING TESTS

Temperatures taken with the Ryan recording thermometers placed in the center of the van loads indicated fairly favorable temperatures en route as follows:

Truck No.	Destination	Temperatures in Transit				
		Start	12 hrs.	1 day	2 days	3 days
		°F	°F	°F	°F	°F
1	New York	80	78	68	70	-
2	Chicago	83	77	68	67	71

The condition of the test bags on arrival and after holding is given in Table 1. The only bag showing more than one percent decay on arrival was a bag of Kennebec potatoes in the top layer of stack one shipped to Chicago.

There was a considerable amount of scald spotting 2/ and browning 3/ in the shipment to New York, especially in the bags exposed to the greatest ventilation (top layer, stack 1). Subsequently, some of this developed into soft rot. Damage was considerably more severe in the Kennebec variety than in Sebago.

1/ Grateful acknowledgment is made to Mr. T. M. Whiteman, Associate Horticulturist, BPISAE, Beltsville, Md., for making the chipping test.

2/ Scald spots may be described as sunken, discolored spots at skinned places on the potatoes.

3/ Browning is a superficial discoloration of skinned areas of the potatoes.

SKINNING AND EXPOSURE TESTS

The tendency of Kennebec to scald or brown more easily than Sebago was verified in the exposure test (Table 2).

The temperatures that developed just under the surface of skinned and non-skinned potatoes were:

(1) after 1 hour 74.7°F. and 82.6°F. respectively.
(2) after 2 hours 73.7°F. and 85.7°F. respectively.

During this time the air temperature was 82 to 85°F. and the temperature of an exposed soil thermograph tube coated with a flat white paint to simulate a white skinned potato was 88 to 92°. The evaporation from the non-skinned potatoes was not sufficient to cool the potatoes as rapidly as heat was absorbed from the sunlight.

Kennebec had considerably more mechanical damage than Sebago as scored by the inspector in Chicago. This was verified by samples collected both before and after grading at shipping point. Since the decay reported on arrival in the market started mostly in bruises caused by mechanical means, the Kennebec variety would appear to be more likely to develop decay in transit than the Sebago variety because of its relative inability to withstand as rough handling.

CHIPPING TESTS

The results of the test on making potato chips are given in Table 3. Readings on the color of chips made from potatoes stored for 3, 7, and 12 days at 50, 60, 70 and 85°F. indicate that in most cases chips made from both Kennebec and Sebago which had been stored at 50° were not of satisfactory color. When held at 60 or 70° the Sebago potatoes made satisfactory chips after 3, 7 and 12 days but Kennebec potatoes held under the same conditions made chips that were judged to be barely salable. Both varieties made good chips when stored at 85° for as long as 12 days.

SUMMARY

In tests made at the shipping point and in shipping tests, the Kennebec variety was more prone to mechanical or handling damage, to injury by desiccation and to decay than the Sebago. In chipping tests Kennebec potatoes did not produce chips equal in quality to those from Sebago potatoes.

ACKNOWLEDGEMENTS

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Table 1. Bacterial Soft Rot, Scald Spots, Browning, and Mechanical Damage in Truck Shipments of Sebago and Kennebec from Charleston, S. C. to New York, N. Y., and Chicago, Ill., June 1950.

TRUCK	DESTINATION	VARIETY	POSITION	CONDITION ON ARRIVAL				CONDITION AFTER HOLDING*			
				Soft Rot %	Scald Spots %	Browning %	Mech. Damage %	Soft Rot %	Scald Spots %	Browning %	Mech. Damage %
1	New York	Sebago	Top Stack 1	0.0	21.2	22.1	-	10.8	13.6	10.1	-
			Top Stack 10	0.0	0.5	0.6	-	0.0	2.7	8.2	-
			Middle Stack 10	0.0	0.0	1.4	-	0.0	0.9	11.8	-
		Kennebec	Top Stack 1	0.0	49.0	28.4	-	31.2	28.6	10.1	-
			Top " 10	0.5	8.8	19.4	-	1.7	14.7	14.1	-
			Middle " 10	0.0	0.4	12.7	-	0.4	8.0	18.7	-
2	Chicago	Sebago	Top Stack 1	0.0	0.0	4.0	0.0	0.0	0.0	10.0	0.0
			Top " 10	0.0	0.0	1.2	0.0	0.0	0.0	4.0	0.0
			Middle " 10	0.0	0.0	0.0	0.0	0.0	0.0	8.0	2.0
		Kennebec	Top Stack 1	4.8	0.0	30.0	4.0	6.0	0.0	40.0	2.0
			Top " 10	0.8	0.0	12.4	4.0	8.0	0.0	18.0	6.0
			Middle " 10	0.0	0.0	24.0	6.0	1.6	0.0	30.0	3.2

* Held 4 days in New York, 7 days in Chicago.

Table 2. Exposure Test on Sebago and Kennebec Potatoes, Charleston, S.C., June 7, 1950

PERIOD OF EXPOSURE	CORRESPONDING ATMOMETER LOSS 1/	SEBAGO			KENNEBEC		
		Browning	Scald Spots	Sticky Scald Spots	Browning	Scald Spots	Sticky Scald Spots
		%	%	%	%	%	%
10:00 - 11:00 A.M.	2.5 c.c.	45.2	0.0	0.0	78.4	0.8	0.0
10:00 - 11:15 A.M.	3.1 c.c	57.6	2.4	0.0	81.6	12.4	0.0
10:00 - 11:30 A.M.	3.7 c.c	57.2	23.6	0.0	56.0	38.4	0.0
10:00 - 11:45 A.M.	4.3 c.c	44.8	30.4	0.0	45.4	46.4	0.8

1/ A white globe porous porcelain atmometer bulb with a coefficient of 0.77 was used. The data are not adjusted with the coefficient.

Table 3. Color Ratings of Potato Chips of Sebago and Kennebec Potatoes 1/

DAYS IN STORAGE	STORAGE TEMPERATURE							
	50°F.		60°F.		70°F.		85°F.	
	Sebago	Kennebec	Sebago	Kennebec	Sebago	Kennebec	Sebago	Kennebec
3	75	65	80	70	75	70	80	80
7	60	55	70	65	75	70	80	80
12	60	50	75	70	70	70	80	80

1/ Shipped by railway express from Charleston, S. C. to Beltsville, Md. The potatoes were dug June 6 and arrived at Beltsville, June 9, 1950. A color rating of 80 represents the preferred light golden brown, while 70 represents the maximum amount of darkening deemed suitable for sale. The color ratings of potatoes at the start of the test were Sebago 90 and Kennebec 80.